

AP2. APPENDIX 2
EQUATIONS USED

AP2.1. CHAPTER 5

<u>English/Metric</u>	<u>Equation Number</u>	<u>Equation</u>
English	C5.T1-1	$D = 1.1W^{1/3}$
Metric	C5.T1-2	$D = 0.44Q^{1/3}$
English	C5.T1-3	$W = D^3/1.33$
Metric	C5.T1-4	$Q = D^3/0.083$
English	C5.2-1	$y(\%) = 50\log_{10}(16.02w)$
Metric	C5.2-2	$y(\%) = 50\log_{10}(1.0w)$
English	C5.2-3	$D_{cd} = 2.5W^{1/3}$
Metric	C5.2-4	$D_{cd} = .99Q^{1/3}$
English	C5.2-5	$D_{cd} = 5.0W^{1/3}$
Metric	C5.2-6	$D_{cd} = 1.98Q^{1/3}$
English	C5.2-7	$D_{cd} = 3.5W^{1/3}$
Metric	C5.2-8	$D_{cd} = 1.39Q^{1/3}$
English	C5.2-9	$D_{cp} = 1.5W^{1/3}$
Metric	C5.2-10	$D_{cp} = 0.59Q^{1/3}$
English	C5.2-11	$D_{cp} = 0.75W^{1/3}$
Metric	C5.2-12	$D_{cp} = 0.30Q^{1/3}$
English	C5.2-13	$C_c = 2.5W^{1/3}$
Metric	C5.2-14	$C_c = .99Q^{1/3}$
English	C5.T2-1	$D_{cd} = 2.5W^{1/3}$
Metric	C5.T2-2	$D_{cd} = 0.99Q^{1/3}$
English	C5.T2-3	$W = D_{cd}^3/15.625$
Metric	C5.T2-4	$Q = D_{cd}^3/0.97$
English	C5.T2-5	$D_{cd} = 5W^{1/3}$
Metric	C5.T2-6	$D_{cd} = 1.98Q^{1/3}$
English	C5.T2-7	$W = D_{cd}^3/125$
Metric	C5.T2-8	$Q = D_{cd}^3/7.762$
English	C5.T2-9	$D_{cd} = 3.5W^{1/3}$
Metric	C5.T2-10	$D_{cd} = 1.39Q^{1/3}$
English	C5.T2-11	$W = D_{cd}^3/42.875$
Metric	C5.T2-12	$Q = D_{cd}^3/2.686$
English	C5.T2-13	$D_{cd} = 1.5W^{1/3}$

Metric	C5.T2-14	$D_{cd} = 0.60Q^{1/3}$
English	C5.T2-15	$W = D_{cd}^3/3.375$
Metric	C5.T2-16	$Q = D_{cd}^3/0.216$
English	C5.T2-17	$D_{cd} = 0.75W^{1/3}$
Metric	C5.T2-18	$D_{cd} = 0.30Q^{1/3}$
English	C5.T2-19	$W = D_{cd}^3/0.422$
Metric	C5.T2-20	$Q = D_{cd}^3/0.027$

AP2.2. CHAPTER 9

English/Metric	Equation Number	Equation
English	C9.4-1	loading density = NEWQD (lbs)/internal volume (ft^3)
Metric	C9.4-2	loading density = NEWQD (kg)/internal volume (m^3)
English	C59.4-3	$d = 40W^{1/3}$
Metric	C9.4-4	$d = 15.87Q^{1/3}$
English	C59.T1-1	$d = 35\text{NEWQD}^{1/3}$
English	C59.T1-2	$d = 35\text{NEWQD}^{1/3}$
English	C59.T1-3	$d = 0.3955\text{NEWQD}^{0.7227}$
English	C59.T1-4	$d = 50\text{NEWQD}^{1/3}$
Metric	C9.T1-5	$d = 13.88\text{NEWQD}^{1/3}$
Metric	C9.T1-6	$d = 13.88\text{NEWQD}^{1/3}$
Metric	C9.T1-7	$d = 0.2134\text{NEWQD}^{0.7227}$
Metric	C9.T1-8	$d = 19.84\text{NEWQD}^{1/3}$
English	C59.T1-9	$\text{NEWQD} = d^3/42,875$
English	C59.T1-10	$\text{NEWQD} = d^3/42,875$
English	C59.T1-11	$\text{NEWQD} = 3.60935d^{1.3837}$
English	C59.T1-12	$\text{NEWQD} = d^3/125,000$
Metric	C9.T1-13	$\text{NEWQD} = d^3/2,674.04$
Metric	C9.T1-14	$\text{NEWQD} = d^3/2,674.04$
Metric	C9.T1-15	$\text{NEWQD} = 8.4761d^{1.3837}$
Metric	C9.T1-16	$\text{NEWQD} = d^3/7,809.53$
English	C59.T1-17	$d = 25\text{NEWQD}^{1/3}$
English	C59.T1-18	$d = 0.004125\text{NEWQD}^{1.0898}$
English	C59.T1-19	$d = 50\text{NEWQD}^{1/3}$
Metric	C9.T1-20	$d = 9.92\text{NEWQD}^{1/3}$
Metric	C9.T1-21	$d = 0.002976\text{NEWQD}^{1.0898}$
Metric	C9.T1-22	$d = 19.84*\text{NEWQD}^{1/3}$
English	C59.T1-23	$\text{NEWQD} = d^3/15,625$

English	C59.T1-24	$NEWQD = 154.2006d^{0.91760}$
English	C59.T1-25	$NEWQD = d^3/125,000$
Metric	C9.T1-26	$NEWQD = d^3/976.19$
Metric	C9.T1-27	$NEWQD = 208.0623d^{0.91760}$
Metric	C9.T1-28	$NEWQD = d^3/7,809.53$
English	C59.T1-29	$d = 40NEWQD^{1/3}$
English	C59.T1-30	$d = 2.42NEWQD^{0.577}$
English	C59.T1-31	$d = 50NEWQD^{1/3}$
Metric	C9.T1-32	$d = 15.87NEWQD^{1/3}$
Metric	C9.T1-33	$d = 1.1640NEWQD^{0.577}$
Metric	C9.T1-34	$d = 19.84NEWQD^{1/3}$
English	C59.T1-35	$NEWQD = d^3/64,000$
English	C59.T1-36	$NEWQD = 0.2162d^{1.7331}$
English	C59.T1-37	$NEWQD = d^3/125,000$
Metric	C9.T1-38	$NEWQD = d^3/3,989.42$
Metric	C9.T1-39	$NEWQD = 0.7686d^{1.7331}$
Metric	C9.T1-40	$NEWQD = d^3/7,809.53$
English	C59.T2-1	$HFD = 291.3 + [79.2 \times \ln(NEWQD)]$
English	C59.T2-2	$HFD = -1133.9 + [389 \times \ln(NEWQD)]$
Metric	C9.T2-3	$HFD = 107.87 + [24.14 \times \ln(NEWQD)]$
Metric	C9.T2-4	$HFD = -251.87 + [118.56 \times \ln(NEWQD)]$
English	C59.T2-5	$NEWQD = \exp [(HFD/79.2) - 3.678]$
English	C59.T2-6	$NEWQD = \exp [(HFD/389) + 2.914]$
Metric	C9.T2-7	$NEWQD = \exp [(HFD/24.14) - 4.4685]$
Metric	C9.T2-8	$NEWQD = \exp [(HFD/118.56) + 2.1244]$
English	C59.T2-9	$HFD = HFD = -1133.9 + [389 \times \ln(NEWQD)]$
Metric	C9.T2-10	$HFD = HFD = -251.87 + [118.56 \times \ln(NEWQD)]$
English	C59.T2-11	$NEWQD = \exp[(HFD/389) + 2.914]$
Metric	C9.T2-12	$NEWQD = \exp[(HFD/118.56) + 2.2144]$
English	C59.T4-1	$d = 10*NEWQD^{1/3}$
English	C59.T4-2	$d = (13.659 - 1.6479 \times 10^{-5}*NEWQD + 1.4358 \times 10^{-11}*NEWQD^2)*NEWQD^{1/3}$
English	C59.T4-3	$NEWQD = d^3/1000$
English	C59.T4-4	$NEWQD = 1.50138 \times 10^8 - 6.73914 \times 10^5*d + 1002.9*d^2 - 0.4938*d^3$
Metric	C9.T4-5	$d = 3.97*NEWQD^{1/3}$
Metric	C9.T4-6	$d = (5.419 - 1.4410 \times 10^{-5}*NEWQD + 2.7684 \times 10^{-11}*NEWQD^2)*NEWQD^{1/3}$
English Metric	C59.T4-7	$NEWQD = d^3/62.429$
Metric	C9.T4-8	$NEWQD = 6.80924 \times 10^7 - 1.002764 \times 10^6*d + 4895.93*d^2 - 7.90884*d^3$

English	C59.T4-9	$d = 7 * \text{NEWQD}^{1/3}$
English	C59.T4-10	$d = (1.0848 + 1.986 \times 10^{-5} * \text{NEWQD}) * \text{NEWQD}^{1/3}$
English	C59.T4-11	$d = 9 * \text{NEWQD}^{1/3}$
English	C59.T4-12	$\text{NEWQD} = d^3 / 343$
English	C59.T4-13	$\text{NEWQD} = 57,424 + 515.89 * d]$
English	C59.T4-14	$\text{NEWQD} = d^3 / 729$
Metric	C9.T4-15	$d = 2.78 * \text{NEWQD}^{1/3}$
Metric	C9.T4-16	$d = (0.4303 + 1.7369 \times 10^{-5} * \text{NEWQD}) * \text{NEWQD}^{1/3}$
Metric	C9.T4-17	$d = 3.57 * \text{NEWQD}^{1/3}$
Metric	C9.T4-18	$\text{NEWQD} = d^3 / 21.413$
Metric	C9.T4-19	$\text{NEWQD} = 26,048 + 767.73 * d$
Metric	C9.T4-20	$\text{NEWQD} = d^3 / 45.511$
English	C59.T4-21	$d = 6 * \text{NEWQD}^{1/3}$
English	C59.T4-22	$d = (-3.059 + 3.0228 \times 10^{-5} * \text{NEWQD}) * \text{NEWQD}^{1/3}$
English	C59.T4-23	$d = 9 * \text{NEWQD}^{1/3}$
English	C59.T4-24	$\text{NEWQD} = d^3 / 216$
English	C59.T4-25	$\text{NEWQD} = 148,160 + 379.7 * d$
English	C59.T4-26	$\text{NEWQD} = d^3 / 729$
Metric	C9.T4-27	$d = 2.38 * \text{NEWQD}^{1/3}$
Metric	C9.T4-28	$d = (-1.2135 + 2.6437 \times 10^{-5} * \text{NEWQD}) * \text{NEWQD}^{1/3}$
Metric	C9.T4-29	$d = 3.57 * \text{NEWQD}^{1/3}$
Metric	C9.T4-30	$\text{NEWQD} = d^3 / 13.485$
Metric	C9.T4-31	$\text{NEWQD} = 67,206 + 565.05 * d$
Metric	C9.T4-32	$\text{NEWQD} = d^3 / 45.511$
English	C59.T4-33	$d = 18 * \text{NEWQD}^{1/3}$
English	C59.T4-34	$\text{NEWQD} = d^3 / 5,832$
Metric	C9.T4-35	$d = 7.14 * \text{NEWQD}^{1/3}$
Metric	C9.T4-36	$\text{NEWQD} = d^3 / 364.086$
English	C59.T4-37	$d = 16 * \text{NEWQD}^{1/3}$
English	C59.T4-38	$d = (9.9683 + 2.0135 \times 10^{-5} * \text{NEWQD}) * \text{NEWQD}^{1/3}$
English	C59.T4-39	$d = 18 * \text{NEWQD}^{1/3}$
English	C59.T4-40	$\text{NEWQD} = d^3 / 4,096$
English	C59.T4-41	$\text{NEWQD} = -118,180 + 390.35 * d$
English	C9.T4-42	$\text{NEWQD} = d^3 / 5,832$
Metric	C9.T4-43	$d = 6.35 * \text{NEWQD}^{1/3}$
Metric	C9.T4-44	$d = (3.9544 + 1.76097 \times 10^{-5} * \text{NEWQD}) * \text{NEWQD}^{1/3}$
Metric	C9.T4-45	$d = 7.14 * \text{NEWQD}^{1/3}$

Metric	C9.T4-46	$NEWQD = d^3/255.709$
Metric	C9.T4-47	$NEWQD = -53,605 + 580.89*d$
Metric	C9.T4-48	$NEWQD = d^3/364.086$
English	C59.T4-49	$d = 12*NEWQD^{1/3}$
English	C59.T4-50	$d = (11.521 + 1.9918 \times 10^{-6}*NEWQD + 2.0947 \times 10^{-11}* NEWQD^2)* NEWQD^{1/3}$
English	C59.T4-51	$d = (1.9389 + 4.0227 \times 10^{-5}*NEWQD)* NEWQD^{1/3}$
English	C59.T4-52	$d = 18*NEWQD^{1/3}$
English	C59.T4-53	$NEWQD = d^3/1,728$
English	C59.T4-54	$NEWQD = -193,080+526.83*d$
English	C59.T4-55	$NEWQD = 60,778 + 255.83*d$
English	C59.T4-56	$NEWQD = d^3/5,832$
Metric	C9.T4-57	$d = 4.76*NEWQD^{1/3}$
Metric	C9.T4-58	$d = (4.5704 + 1.7420 \times 10^{-6}*NEWQD + 4.0389 \times 10^{-11}* NEWQD^2)* NEWQD^{1/3}$
Metric	C9.T4-59	$d = (0.7692 + 3.5182 \times 10^{-5}*NEWQD)* NEWQD^{1/3}$
Metric	C9.T4-60	$d = 7.14*NEWQD^{1/3}$
Metric	C9.T4-61	$NEWQD = d^3/107.877$
Metric	C9.T4-62	$NEWQD = -87,578 + 784.00*d$
Metric	C9.T4-63	$NEWQD = 27,568 + 380.7*d$
Metric	C9.T4-64	$NEWQD = d^3/364.086$
English	C59.T5-1	$d = 9*NEWQD^{1/3}$
Metric	C9.T5-2	$d = 3.57*NEWQD^{1/3}$
English	C59.T5-3	$NEWQD = d^3/729$
Metric	C9.T5-4	$NEWQD = d^3/45.511$
English	C59.T5-5	$d = 18*NEWQD^{1/3}$
Metric	C9.T5-6	$d = 7.14*NEWQD^{1/3}$
English	C59.T5-7	$NEWQD = d^3/5,832$
Metric	C9.T5-8	$NEWQD = d^3/364.086$
English	C59.T9-1	$IBD = -735.186 + [237.559 \times (\ln(\text{Number of items} \times NEWQD))] - [4.274 \times (\ln(\text{Number of items} \times NEWQD))^2]$
Metric	C9.T9-2	$IBD = -167.648 + [70.345 \times (\ln(\text{Number of items} \times NEWQD))] - [1.303 \times (\ln(\text{Number of items} \times NEWQD))^2]$
English	C59.T9-3	$\text{Number of items} \times NEWQD = \exp[27.791 - (600.392 - 0.234 \times IBD)^{1/2}]$
Metric	C9.T9-4	$\text{Number of items} \times NEWQD = \exp[27.000 - (600.287 - 0.768 \times IBD)^{1/2}]$
English	C59.T10-1	$\text{Hazardous debris distance} = -1133.9 + [389 \times \ln(MCE)]$
Metric	C9.T10-2	$HFD = -251.87 + [118.56 \times \ln(MCE)]$
English	C9.T10-3	$MCE = \exp[(\text{Hazardous Debris Distance}/389) + 2.914]$
English	C59.T10-4	$MCE = \exp[(\text{Hazardous Debris Distance}/118.56) + 2.1244]$

English	C59.T11-1	$IBD = 101.649 - [15.934 \times (\ln(\text{Number of items} \times \text{NEWQD}))] + [5.173 \times (\ln(\text{Number of items} \times \text{NEWQD}))^2]$
Metric	C9.T11-2	$IBD = 28.127 - [2.364 \times (\ln(\text{Number of items} \times \text{NEWQD}))] + [1.577 \times (\ln(\text{Number of items} \times \text{NEWQD}))^2]$
English	C59.T11-3	$\text{Number of items} \times \text{NEWQD} = \exp [1.5401 + (-17.278 + 0.1933 \times IBD)^{1/2}]$
Metric	C9.T11-4	$\text{Number of items} \times \text{NEWQD} = \exp [0.7495 + (-17.274 + 0.6341 \times IBD)^{1/2}]$
English	C59.T13-1	$d_{IBD, PTRD} = \exp[2.47 + 0.2368 * (\ln(\text{NEWQD})) + 0.00384 * (\ln(\text{NEWQD}))^2]$
English	C59.T13-2	$d_{IBD, PTRD} = \exp[7.2297 - 0.5984 * (\ln(\text{NEWQD})) + 0.04046 * (\ln(\text{NEWQD}))^2]$
English	C59.T13-3	$d_{IBD, PTRD} = 8 * \text{NEWQD}^{1/3}$
Metric	C9.T13-4	$d_{IBD, PTRD} = \exp[1.4715 + 0.2429 * (\ln(\text{NEWQD})) + 0.00384 * (\ln(\text{NEWQD}))^2]$
Metric	C9.T13-5	$d_{IBD, PTRD} = \exp[5.5938 - 0.5344 * (\ln(\text{NEWQD})) + 0.04046 * (\ln(\text{NEWQD}))^2]$
Metric	C9.T13-6	$d_{IBD, PTRD} = 3.17 * \text{NEWQD}^{1/3}$
English	C59.T13-7	$\text{NEWQD} = \exp[-30.833 + (307.465 + 260.417 * (\ln(d_{IBD, PTRD})))^{1/2}]$
English	C59.T13-8	$\text{NEWQD} = \exp[7.395 + (-124.002 + 24.716 * (\ln(d_{IBD, PTRD})))^{1/2}]$
English	C59.T13-9	$\text{NEWQD} = d_{IBD, PTRD}^3 / 512$
Metric	C9.T13-10	$\text{NEWQD} = \exp[-31.628 + (617.102 + 260.417 * (\ln(d_{IBD, PTRD})))^{1/2}]$
Metric	C9.T13-11	$\text{NEWQD} = \exp[6.604 + (-94.642 + 24.716 * (\ln(d_{IBD, PTRD})))^{1/2}]$
Metric	C9.T13-12	$\text{NEWQD} = d_{IBD, PTRD}^3 / 131.964$
English	C59.T13-13	$d_{IMD, ILD} = \exp[2.0325 + 0.2488 * (\ln(\text{NEWQD})) + 0.00313 * (\ln(\text{NEWQD}))^2]$
English	C59.T13-14	$d_{IMD, ILD} = \exp[4.338 - 0.1695 * (\ln(\text{NEWQD})) + 0.0221 * (\ln(\text{NEWQD}))^2]$
English	C59.T13-15	$d_{IMD, ILD} = 5 * \text{NEWQD}^{1/3}$
Metric	C9.T13-16	$d_{IMD, ILD} = \exp[1.0431 + 0.2537 * (\ln(\text{NEWQD})) + 0.00313 * (\ln(\text{NEWQD}))^2]$
Metric	C9.T13-17	$d_{IMD, ILD} = \exp[3.0297 - 0.1346 * (\ln(\text{NEWQD})) + 0.0221 * (\ln(\text{NEWQD}))^2]$
Metric	C9.T13-18	$d_{IMD, ILD} = 1.98 * \text{NEWQD}^{1/3}$
English	C59.T13-19	$\text{NEWQD} = \exp[-39.744 + (930.257 + 319.49 * (\ln(d_{IMD, ILD})))^{1/2}]$
English	C59.T13-20	$\text{NEWQD} = \exp[3.834 + (-181.58 + 45.249 * (\ln(d_{IMD, ILD})))^{1/2}]$
English	C59.T13-21	$\text{NEWQD} = d_{IMD, ILD}^3 / 125$
Metric	C9.T13-22	$\text{NEWQD} = \exp[-40.527 + (1309.19 + 319.49 * (\ln(d_{IMD, ILD})))^{1/2}]$
Metric	C9.T13-23	$\text{NEWQD} = \exp[3.045 + (-127.817 + 45.249 * (\ln(d_{IMD, ILD})))^{1/2}]$
Metric	C9.T13-24	$\text{NEWQD} = d_{IMD, ILD}^3 / 7.804$
English	C59.T15-1	$D_{IBD, PTRD} = 40W^{1/3}$
Metric	C9.T15-2	$D_{IBD, PTRD} = 15.87Q^{1/3}$
English	C59.T15-3	$D_{IMD, ILD} = 18W^{1/3}$
Metric	C9.T15-4	$D_{IMD, ILD} = 7.14Q^{1/3}$
English	C59.T15-5	$D_{IBD, PTRD} = 8W^{1/3}$
English	C59.T15-6	$\text{NEWQD} = D_{IBD, PTRD}^3 / 512$
Metric	C9.T15-7	$D_{IBD, PTRD} = 3.17Q^{1/3}$

Metric	C9.T15-8	$NEWQD = D_{IBD, PTRD}^3 / 31.86$
English	C59.T15-9	$D_{IMD, ILD} = 5W^{1/3}$
English	C59.T15-10	$NEWQD = D_{IMD, ILD}^3 / 125$
Metric	C9.T15-11	$D_{IMD, ILD} = 1.98Q^{1/3}$
Metric	C9.T15-12	$NEWQD = D_{IMD, ILD}^3 / 7.76$
English	C59.T17-1	lbs of energetic liquids = gallons X density of energetic liquids (lbs/gallon)
Metric	C9.T17-2	kg of energetic liquids = liters X density of energetic liquids (kg/liter)
English	C59.T17-3	1 lb/gallon = 8.345 kg/liter
English	C59.T17-4	1 kg/liter = 0.1198 lb/gallon
English	C59.T20-1	Distance = $149.3 * W^{(-0.41+0.059*\ln(W))}$
English	C59.T20-2	Distance = $24 * W^{1/3}$
Metric	C9.T20-3	Distance = $34.2 * W^{(-0.317+0.059*\ln(W))}$
Metric	C9.T20-4	Distance = $9.52 * W^{1/3}$
English	C59.T20-5	$W = \exp[-313.18 + 206.53 * (\ln(Distance)) - 49.968 * (\ln(Distance))^2 + 5.5354 * (\ln(Distance))^3 - 0.2119 * (\ln(Distance))^4]$
Metric	C9.T20-6	$W = \exp[-130.32 + 108.79 * (\ln(Distance)) - 32.587 * (\ln(Distance))^2 + 4.3313 * (\ln(Distance))^3 - 0.21111 * (\ln(Distance))^4]$
English	C59.T22-1	Unprotected Distance = $28 * W^{1/3}$
Metric	C9.T22-2	Unprotected Distance = $11.11 * W^{1/3}$
English	C59.T22-3	$W = (\text{Unprotected Distance}/28)^3$
Metric	C9.T22-4	$W = (\text{Unprotected Distance}/11.11)^3$
English	C59.T22-5	Protected Distance = $-154.1 + 72.89 * [\ln(W)] - 6.675 * [\ln(W)]^2 + 0.369 * [\ln(W)]^3$
Metric	C9.T22-6	Protected Distance = $-30.62 + 19.211 * [\ln(W)] - 1.7678 * [\ln(W)]^2 + 0.1124 * [\ln(W)]^3$
English	C59.T22-7	$W = \exp[311.367 - 215.761 * (\ln(\text{protected distance})) + 55.1828 * (\ln(\text{protected distance}))^2 - 6.1099 * (\ln(\text{protected distance}))^3 + 0.25343 * (\ln(\text{protected distance}))^4]$
Metric	C9.T22-8	$W = \exp[122.38 - 108.8094 * (\ln(\text{protected distance})) + 35.5517 * (\ln(\text{protected distance}))^2 - 4.9055 * (\ln(\text{protected distance}))^3 + 0.25343 * (\ln(\text{protected distance}))^4]$
English	C59.T23-1	$D = 30W^{1/3}$
Metric	C9.T23-2	$D = 11.90Q^{1/3}$
English	C59.T23-3	$NEWQD = D^3 / 27,000$
Metric	C9.T23-4	$NEWQD = D^3 / 1,685.2$
English	C59.T25-1	$d = 2W^{1/3}$
Metric	C9.T25-2	$d = 0.79Q^{1/3}$
English	C59.7-1	$D_{ig} = 5.8W^{1/3}$

Metric	C9.7-2	$D_{ig} = 2.30Q^{1/3}$
English	C59.7-3	$D_{ig} = 12.5f_gW^{4/9}$
Metric	C9.7-4	$D_{ig} = 5.41f_gQ^{4/9}$
English	C59.7-5	$D_{ig} = 11.1f_gW^{4/9}$
Metric	C9.7-6	$D_{ig} = 4.81f_gQ^{4/9}$
English	C59.7-7	$D_{ig} = 2.1f_gW^{4/9}$
Metric	C9.7-8	$D_{ig} = 0.91f_gQ^{4/9}$
English	C59.7-9	$f_g = 0.267w^{0.3}$
Metric	C9.7-10	$f_g = 0.11604w^{0.3}$
English	C59.7-11	$D_{id} = f_d*f_c*W^{0.4}$
Metric	C9.7-12	$D_{id} = f_d*f_c*Q^{0.41}$
English	C59.7-13	$f_d = 0.6w^{0.18}$
Metric	C9.7-14	$f_d = 0.3615 w^{0.18}$
English	C59.7-15	$R = 149.3*D_{HYD}*((W/V_E)^{0.5}/p_{so})^{1/1.4}$
Metric	C9.7-16	$R = 220.191*D_{HYD}*((W/V_E)^{0.5}/p_{so})^{1/1.4}$
English	C59.7-17	$R(\theta) = R(\theta=0)/(1 + (\theta/56)^2)^{1/1.4}$
English	C59.7-18	$P_{so} = 44.57*W^{-0.314}$
Metric	C9.7-19	$P_{so} = 239.753*W^{-0.314}$
English	C59.7-20	$R = 131.1*D_{HYD}*(W/V_E)^{1/2.8}$
Metric	C9.7-21	$R = 48.683*D_{HYD}*(W/V_E)^{1/2.8}$
English	C59.7-22	$R = 9.91*D_{HYD}*W^{0.581}/V_E^{0.357}$
Metric	C9.7-23	$R = 4.395*D_{HYD}*W^{0.581}/V_E^{0.357}$
English	C59.7-24	$R = 161.0*D_{HYD}*(W/V_E)^{1/2.8}$
Metric	C9.7-25	$R = 59.787*D_{HYD}*(W/V_E)^{1/2.8}$
English	C59.T31-1	$f_c = 8.0178 - 0.1239*C + 27.1578*C^2 - 40.1461*C^3 + 21.9018*C^4 - 5.3529*C^5 + 0.4948*C^6$
English	C59.T31-2	$f_c = 10.8116 - 25.0685*C + 113.9591*C^2 - 168.1092*C^3 + 107.1033*C^4 - 31.5032*C^5 + 3.5251*C^6$
Metric	C9.T31-3	$f_c = 3.3794 - 0.1316*C + 72.7376*C^2 - 271.0478*C^3 + 372.7526*C^4 - 229.651*C^5 + 53.5115*C^6$
Metric	C9.T31-4	$f_c = 4.5570 - 26.6351*C + 305.2201*C^2 - 1134.995*C^3 + 1822.82*C^4 - 1351.556*C^5 + 381.2317*C^6$
English	C59.T32-1	$R(\theta)/R = [1 + (\theta/56)^2]^{(-1/1.4)}$
English	C59.T34-1	$R(\theta)/(D_{HYD}/V_E^{1/1.4}) = 149.3*\{W^{0.5}/[p_{so}(1 + (\theta/56)^2)]\}^{1/1.4}$
English	C59.T34-2	$p_{so} = 44.57* W^{-0.314}$
Metric	C9.T34-3	$R(\theta)/(D_{HYD}/V_E^{1/1.4}) = 149.3*\{W^{0.5}/[p_{so}(1 + (\theta/56)^2)]\}^{1/1.4}$
Metric	C9.T34-4	$p_{so} = 239.759* W^{-0.314}$

English	C59.T35-1	$MFR = 759 + 1251 * \ln(Diameter)$ $MFD = 711 * D^{(0.91 - 0.073 * \ln(D))}$
English	C59.T35-2	$Diameter = \exp[(MFR/1251) - 0.61]$ $Diameter = \exp[6.233 - \{128.804 - 13.699 * \ln(MFD)\}^{1/2}]$
Metric	C9.T35-3	$MFR = 1002.08 + 381.305 * \ln(Diameter)$ $MFD = 5.318 * D^{(1.382 - 0.073 * \ln(D))}$
EnglishMetric	C59.T35-4	$Diameter = \exp[(MFR/381.305) + 2.628]$ $Diameter = \exp[9.467 - \{112.531 - 13.699 * \ln(MFD)\}^{1/2}]$
English	C59.T35-5	$MFR = 2641 + 2998 * \ln(Diameter)$ $MFD = 854.8 * D^{0.682}$
MetricEnglish	C9.T35-6	$Diameter = \exp[(MFR/2998) + 0.88]$ $Diameter = (5.0243E-05) * MFD^{1.4663}$
Metric	C9.T35-7	$MFR = 3760.859 + 913.79 * \ln(Diameter)$ $MFD = 28.693 * D^{0.682}$
Metric	C9.T35-8	$Diameter = \exp[(MFR/913.79) + 4.1157]$ $Diameter = (7.2862E-03) * MFD^{1.4663}$
English	C9.T35-9	$MFD = 840 * D^{(0.645 - 0.07 * \ln(D))}$
English	C9.T35-10	$Diameter = \exp[4.607 - \{117.417 - 14.286 * \ln(MFD)\}^{1/2}]$
Metric	C9.T35-11	$MFD = 15.278 * D^{(1.098 - 0.07 * \ln(D))}$
Metric	C9.T35-12	$Diameter = \exp[7.842 - \{100.448 - 13.699 * \ln(MFD)\}^{1/2}]$
English	C9.T36-1	$MFD = 2404 + 394.5 * \ln(W)$
English	C9.T36-2	$W = \exp[(MFD - 2404)/565.9]$
Metric	C9.T36-3	$MFD = 827.8 + 120.2 * \ln(W)$
Metric	C9.T36-4	$W = \exp[(MFD - 827.8)/120.2]$
English	C9.T36-5	$MFD = 2756 + 565.9 * \ln(W)$
English	C9.T36-6	$W = \exp[(MFD - 2756)/565.9]$
Metric	C9.T36-7	$MFD = 976.4 + 172.5 * \ln(W)$
Metric	C9.T36-8	$W = \exp[(MFD - 976.4)/172.5]$
English	C9.T36-9	$MFD = 1561.3 + 191.8 * \ln(W)$
English	C9.T36-10	$W = \exp[(MFD - 1561.3)/191.8]$
Metric	C9.T36-11	$MFD = 522.6 + 58.5 * \ln(W)$
Metric	C9.T36-12	$W = \exp[(MFD - 522.6)/58.5]$

AP2.3. CHAPTER 10

English/Metric	Equation Number	Equation
English	C510.T1-1	$D1 = 2 * NEWQD^{1/3}$
English	C510.T1-2	$NEWQD = (D1/2)^3$

Metric	C10.T1-3	$D1 = 0.79 * NEWQD^{1/3}$
Metric	C10.T1-4	$NEWQD = (D1/0.79)^3$
English	C510.T1-5	$D2 = 6 * NEWQD^{1/3}$
English	C510.T1-6	$NEWQD = (D2/6)^3$
Metric	C10.T1-7	$D2 = 2.38 * NEWQD^{1/3}$
Metric	C10.T1-8	$NEWQD = (D2/2.38)^3$
English	C510.T1-9	$D3 = 12 * NEWQD^{1/3}$
English	C510.T1-10	$NEWQD = (D3/12)^3$
Metric	C10.T1-11	$D3 = 4.76 * NEWQD^{1/3}$
Metric	C10.T1-12	$NEWQD = (D3/4.76)^3$
English	C510.T1-13	$D4 = 8 * NEWQD^{1/2}$
English	C510.T1-14	$NEWQD = (D4/8)^2$
Metric	C10.T1-15	$D4 = 3.62 * NEWQD^{1/2}$
English Metric	C510.T1-16	$NEWQD = (D4/3.62)^2$
English	C510.T1-17	$D5 = 12.2 * NEWQD^{1/2}$
English	C510.T1-18	$NEWQD = (D5/12.2)^2$
Metric	C10.T1-19	$D5 = 5.43 * NEWQD^{1/2}$
Metric	C10.T1-20	$NEWQD = (D5/5.43)^2$
English	C510.T1-21	$D6 = -4.49 + 0.487 * (NEWQD^{1/3}) + 2.928 * (NEWQD^{1/3})^2$
English	C510.T1-22	$NEWQD = (0.0833 + [1.5421 + 0.3416 * D6]^{1/2})^3$
Metric	C10.T1-23	$D6 = -1.37 + 0.193 * (NEWQD^{1/3}) + 1.512 * (NEWQD^{1/3})^2$
Metric	C10.T1-24	$NEWQD = (0.0640 + [0.9108 + 0.6615 * D6]^{1/2})^3$
English	C510.T2-1	$d = 24W^{1/3}$
Metric	C10.T2-2	$d = 9.52 W^{1/3} d = 9.52 Q^{1/3}$
English	C510.T2-3	$d = 30W^{1/3}$
Metric	C10.T2-4	$d = 11.90 W^{1/3} d = 11.90 Q^{1/3}$
English	C510.T3-1	$d = 24W^{1/3}$
Metric	C10.T3-2	$d = 9.52 W^{1/3} d = 9.52 Q^{1/3}$
English	C510.T3-3	$d = 30W^{1/3}$
Metric	C10.T3-4	$d = 11.90 W^{1/3} d = 11.90 Q^{1/3}$
English	C510.T4-1	$d = 24W^{1/3}$
Metric	C10.T4-2	$d = 9.52 W^{1/3} d = 9.52 Q^{1/3}$
English	C510.T4-3	$d = 30W^{1/3}$
Metric	C10.T4-4	$d = 11.90 W^{1/3} d = 11.90 Q^{1/3}$